

## REMARKS

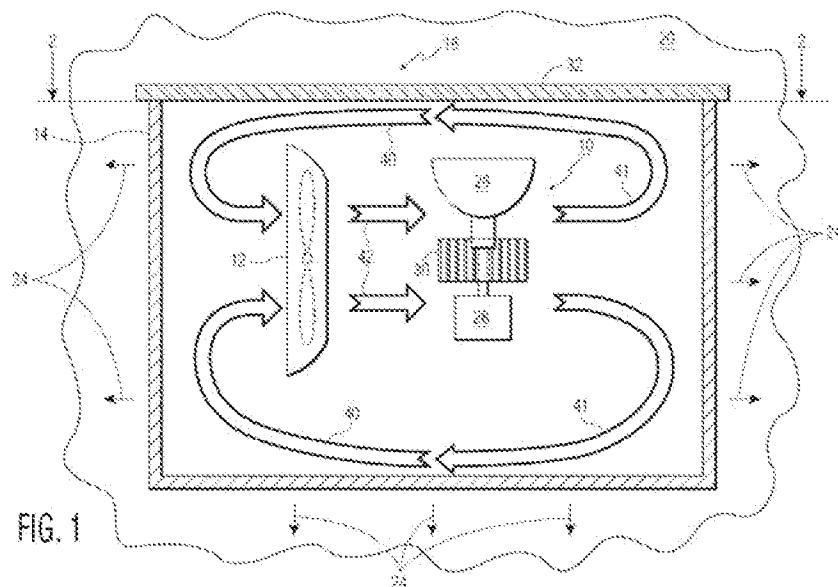
Claim 1 and 21 have been amended herein, and their patentability is shown. No new matter has been added to the claims. The amended matter has been taken from presently cancelled Claims 26, 32, 33, and 34. Claims 26-34 have been cancelled.

### ***Status of the Claims***

Claims 1-25 and Claims 35-36 are pending in the present application.

### ***Summary of Claimed Subject Matter***

Applicants' amended Claim 1 may be read on the following, exemplary embodiment of the invention:



Claim 1 in italics as read on foregoing figure:

1. *A light appliance and a cooling arrangement, comprising:*
  - a) *a light appliance [10];*
  - b) *a liquid-tight enclosure [16] for the light appliance that gives off unwanted heat into surrounding air within the enclosure during operation, the enclosure having an external wall [14] at least part of which is thermally conductive;*

- c) an electrical driver [28] within the enclosure comprising an electrical or electromagnetic device for converting voltage and/or limiting current to the light appliance;
- d) an air circulating device [12] within the enclosure for circulating air, heated by the light appliance or by the air circulating device, to the thermally conductive portion of the external wall;
- e) being sufficiently cooler than the external wall of the enclosure that the air circulating device removes sufficient heat from the air by dissipating the heat into the cooler medium through said thermally conductive portion so as to substantially increase lifetime of the light appliance;

[The following underlined elements have been described in the US Patent 4,419,716 to Koo:]

- f) the enclosure being free of a channel formed between an interior surface of the external wall of the enclosure to receive forced air heated by the light appliance and a sleeve liner [42 in Fig. 3, Col. 3, lines 27-50] surrounding the light appliance, for controllably recirculating forced air within the enclosure;
- g) the external wall being free of multiple heat fins [38 and 40, Fig. 2, Col. 2, line 67 to Col. 3, line 26] being extended between an inner surface of the external wall and a sleeve liner; and
- h) the enclosure being free of a one-way air valve [62 in Fig. 3, Col. 4, lines 14-25] that opens a passage into the interior of the enclosure from the exterior of the enclosure when the pressure on a portion of the valve at the exterior of the enclosure exceeds the pressure on a portion of the valve at an interior of the enclosure.

Independent amended Claim 21, which is similar to Claim 1 except Claim 21 recites water as the medium should also be read in conjunction with the preceding exemplary embodiment of the invention.

Paragraph (c) of amended Claims 1 and 21 recites an electrical driver for converting voltage and/or limiting current to the light appliance. An electrical driver constitutes an electrical or electromagnetic device used for supplying power to the light source. Specification at Page 5, lines 18-20. Such an electrical driver constitutes a lamp ballast. Lamp ballast is defined as a device used to provide the starting voltage or to stabilize the current in a circuit (as of a fluorescent lamp) (<http://www.m-w.com/dictionary/ballast>).

It is known in the art, "that for every 10 degrees Celsius increase in temperature, the wear out of various ballast components (e.g., electrolytic capacitors) is accelerated by about 50 percent." US Patent 5,629,581 at Col. 1, lines 49-52. See also US Patent 4,490,649 at Col. 1, lines 37-38 ("every 10° C. decrease of the ballast temperature will double its lifetime"); see US Patent 4,490,649 at Col. 5 lines 36-38 ("[heat-reduction means] "to reduce the ballast temperature and prolong the lifetime of said lamp"); US Patent 4,383,200 at Col. 1, lines 31-37 ("there is the risk during operation that, owing to the heat generated by the ballast, the temperature of the ballast increases to such a high value, that insulating material around the wire of the induction coil which forms part of the ballast is easily attacked");

Therefore, lamp ballasts are heat sensitive, and significant increase in temperature drastically reduces their lifetime.

The invention of amended Claims 1 and 21 engages two principal methods of cooling the electrical driver 28 (FIG. 1 above). These two methods, as follows, keep the temperature of the electrical driver or ballast tolerably low, in order to increase its lifetime and thus that of the light appliance.

- 1. Air circulating device.** Claims 1 and 21 recites an air circulating device 12 (FIG. 1 above) such as a fan which is placed within the liquid-tight enclosure to create what may be called a convection cell by blowing air over the hot source and/or heat sink. Specification at Page 4, lines 13-23. Air blowing over the source is heated by the source and carries thermal energy away from the source. *Id.* The heated air comes in contact with the thermally conductive wall(s) and heats the relatively cool wall(s). *Id.*
- 2. Medium with specific thermal properties.** Claims 1 and 21 also recite a medium 20 (FIG. 1 above) that is in contact with said external wall of the

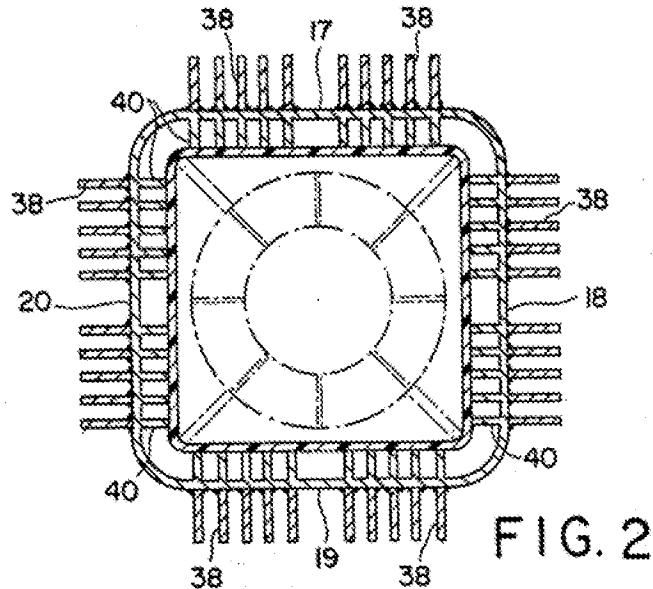
enclosure. As recited in the claims, the medium has adequate thermal conductivity, and is sufficiently cooler than the external wall of the enclosure, that an air circulating device for circulating air, heated by the light appliance or by the air circulating device, to the thermally conductive portion of the external wall removes sufficient heat from the air by dissipating the heat into the cooler medium through the thermally conductive portion. Keeping the electrical driver or ballast sufficiently cool increases the life of the electrical driver or ballast and reduces the risk of the failure of the ballast. Specification at Page 9, lines 9-14.

#### *Grounds of Rejection*

Claims 1-34 stand rejected under 35 USC 103 (a) as unpatentable over USP 4,419,716 to Koo (hereinafter "Koo") in view of USP 5,432,688 to Tobias et al. (hereinafter "Tobias").

#### *Summary of the Cited Art*

The features of USP 4,419,716 to Koo are described in connection with the following exemplary Figs. 2 and 3 from that patent, reproduced below:



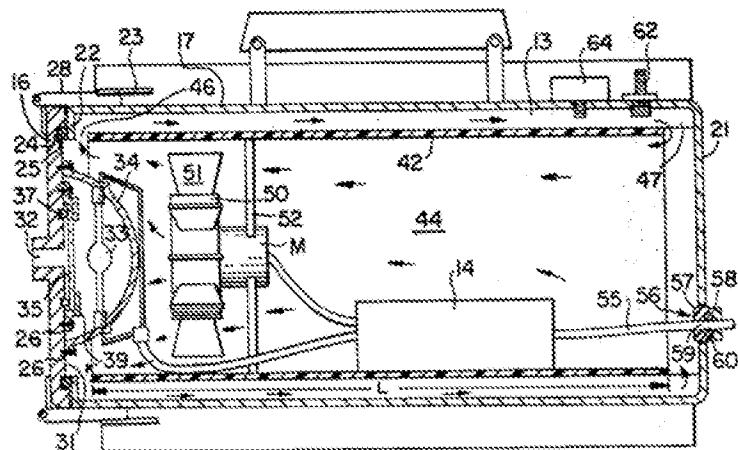


FIG. 3

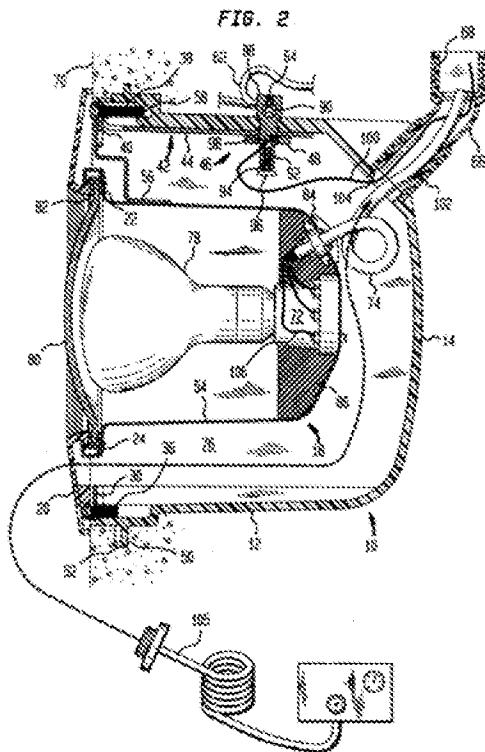
Koo teaches presence of an electrical driver or ballast 14 for lamp 33. Koo recognizes the principal that an increase in the housing temperature causes an electrical device (e.g., lighting system) to malfunction or fail. Col. 1, lines 34-35. This is a restatement of the principle stated above that an increase in temperature reduces the lifetime of the lamp ballast. The housing assembly of Koo comprises a sealed enclosure to isolate the electrical device and for maintaining the temperature within safe limits so as to prevent the failure, or reducing the lifetime, of the electrical device. Col. 1, lines 42-47.

Koo employs following four principal mechanisms for the removal of heat from the electrical device:

1. **Electrical fan.** An electrical fan 50 drives air or another coolant in a predetermined pattern. Col. 4, line 1-2.
2. **Channel.** A channel is formed between the inner surface of the external wall and a sleeve liner 42 when the sleeve liner is inserted into the enclosure 13 for controllably recirculating forced air or another medium. Col. 3, lines 26-32. The air flows from inside the central compartment 44, passing through the clearance space 46 between the sleeve liner 42 and the front door panel 16, whereupon the air reverses direction and travels axially from the front door panel 16 to the rear wall 21 in intimate contact with the internal heat exchange fins 40. Col. 4, lines 1-11.

3. **Heat exchange fins.** Koo further engages multiple numbers of heat exchange fins 40 (Fig. 2 above) projecting from the casing within the interior of the enclosure to transfer the heat from the interior of the enclosure to the ambient atmosphere. The number of exterior and interior fins 38 and 40, the distance separating the exterior fins 38 from one another and the spacing between interior fins 40 are design factors relating to the efficiency in heat transfer between the interior fins 40 and the exterior fins 38. Col. 3, lines 11-16.
4. **One-way air valve.** A one way air valve 62 is threadably inserted through one of the side walls 17 into the enclosure 13. The air within the enclosure 13 is preferably pressurized which increases the efficiency of heat transfer between the enclosure and the ambient atmosphere. Col. 4, lines 11-19.

USP 5,432,688 to Tobias et al. is described in connection with the following Fig. 2 from that patent reproduced below:



Tobias employs an incandescent lamp 78 in an underwater enclosure. The underwater enclosure of Tobias does not use an electrical driver or ballast for the lamp; rather electrical power is directly supplied to the lamp. The assembly of Tobias et al. provides an incandescent light socket 72 to hold incandescent lamp 78. The incandescent light socket is directly connected to a power source using a power cable 74.

### ***Argument***

As detailed above, Claims 1 and 21 solve the thermal issue of keeping an electrical driver (or ballast) for a lamp (e.g., light appliance) to a tolerable limit to substantially increase lifetime of the lamp/light appliance.

In solving the thermal issue, Claims 1 and 21 employ the two key heat-removal mechanisms of an air circulating device (e.g., fan) and a "medium" defined in the foregoing claims with specific thermal properties so that "the air circulating device removes sufficient heat from the air \* \* \* so as to substantially increase lifetime of the light appliance."

Koo also solves a thermal issue of keeping an electrical driver or ballast (14) for a lamp to a tolerable limit to substantially increase lifetime of a lamp (see Col. 1, lines 34-34). However, Koo employs four key heat-removal mechanisms for this purpose. Putting aside the use of a fan, which is common to both an embodiment of Claims 1 and 21 and to Koo's assembly, the presently claimed heat-removal mechanism concerning a "medium" differs from the other three-heat removal mechanisms of Koo. And, the other three heat-removal mechanisms of Koo are excluded from Claims 1 and 21 by the last three paragraphs of each claim.

In more detail, the claimed "medium" with its specifically recited thermal properties, etc. differs from Koo's three heat-removal mechanisms, detailed above, of:

- (1) Channel between inner surface of external wall of assembly and sleeve liner 42;
- (2) Heat-exchange fins extending into the cooling channel, and
- (3) One-way air valve to enable pressurization for increasing heat-removal from the assembly.

The examiner has failed to shown any known interchangeability between the presently claimed "medium" with its specifically defined thermal properties, etc., and the foregoing, three heat-removal mechanisms of Koo.

The examiner's reference to Tobias fails to remedy the foregoing deficiencies of Koo. Tobias lacks an electrical driver (or ballast) as claimed for a light appliance, and so was not faced with the present thermal issue that was solved differently by the present claims and by Koo, such thermal issue concerning the need to keep the temperature of an electrical driver (or ballast) for a light appliance tolerably low, to preserve lifetime of the driver/ballast. Rather, Tobias discloses an underwater light fixture including an incandescent lamp 78, which is directly powered by cable 74 leading to an incandescent light socket 72.

Not facing the present thermal issue, Tobias can run his incandescent lamp at elevated temperatures without regard to any need to keep temperature of a lamp driver/ballast tolerably low to preserve driver/ballast lifetime. As can be thus appreciated, Tobias fails to show any known interchangeability between the presently claimed "medium" with its specifically defined thermal properties, etc., and the above mentioned heat-removal mechanisms (1) – (3) of Koo. For this reason, neither Koo nor Tobias, nor the combined teachings of Koo and Tobias, render obvious the invention of Claims 1 and 21.

Accordingly, Claims 1 and 21 should be allowed, together with their dependent claims, which define further features of the invention. By way of example, dependent Claims 35 and 36 refer to the "external wall [being] free of multiple heat fins projecting outwardly from an outer surface of the external wall." These claims further distinguish over Koo, which includes the foregoing heat fins (38).

***Conclusion***

The pending claims should be allowed.

I certify that the foregoing document and any document(s) referenced below are being filed electronically with the USPTO using the private PAIR system on the date stated below.

Dated: October 2, 2006

Respectfully submitted,



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